Using pacific oyster *Crassostrea gigas* for sediment stabilization: how their effectiveness depends on biological and environmental setting

João Salvador de Paiva[1], Brenda Walles[2], Tom Ysebaert[2] and Tjeerd Bouma[1]

[1] HZ University of Applied Sciences, Edisonweg 4 4382 NW Vlissingen, The Netherlands
E-mail: j.n.salvadordepaiva@hz.nl

[2] NIOZ Royal Netherlands Institute for Sea Research, Korringaweg 7, 4401 NT Yerseke, The Netherlands

Ecosystem-based coastal defense is a promising way to climate proof estuaries and coastlines. One of the advocated methodologies is creation, restoration or conservation of intertidal ecosystem engineering species that stabilize shorelines and attenuate waves. The Pacific oyster (*Crassostrea gigas*) is an ecosystem engineer known for its wave attenuating, sediment trapping and stabilization capacity. The aim of this research is 1) to quantify to what extent oysters' ability to stabilize sediment is conditional, and 2) if this effect can be predicted based on physical forcing, morphological characteristics of the tidal flat, and biological characteristics of the oyster reef. This was investigated by correlating long-term sediment accretion patterns of tidal flats covered by natural intertidal oyster reefs to reef characteristics and abiotic conditions.

Results showed that stabilization of sediment by oysters increases under erosional conditions. Furthermore, our results showed that tidal flat shape determine the strength of the engineering , as larger elevation changes were found in convex tidal flats versus concave tidal flats. Additionally, there is a relation between sediment stabilization and reef characteristics, as a lower width to length ratio and higher patch or oyster densities increase the ability to accrete and stabilize sediment within the reef.

The ability of *C. gigas* to shape its environment depends both on biotic and abiotic conditions. Stabilizing effects of oyster reefs on tidal flats stress their importance as ecosystem engineers in erosion dominated estuaries and coastlines. Conservation of oyster reefs, as well as construction of artificial reefs could be an important management tool for tidal flat protection and conservation.